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Chronoamperometric evaluation of the antioxidant capacity of tea on a polyquercetin-modified electrode

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Abstract

© 2017, Pleiades Publishing, Ltd.It was established that the components of tea are oxidized on a glassy carbon electrode modified with carbon nanotubes and electropolymerized quercetin in a phosphate buffer solution (pH 7.0) as a supporting electrolyte under conditions of differential pulse voltammetry. The oxidation potentials of the individual phenolic antioxidants of tea (gallic acid, rutin, quercetin, catechin, epigallocatechin gallate, and tannin) on the modified electrode were found. A method for the chronoamperometric determination of the antioxidant capacity (AOC) of tea was developed based on the oxidation of tea antioxidants at a potential of 0.20 V. The AOC of tea was evaluated using a difference between the oxidation currents of the analyte and a supporting electrolyte after 50 s of electrolysis in terms of gallic acid. The analytical range of gallic acid was 0.25–750 μM with a detection limit of 0.063 μM. Positive correlations of the AOC with antioxidant activity in a reaction with 2,2-diphenyl-1-picrylhydrazyl and the total phenolic content were found (r = 0.700 and 0.647 at rcrit = 0.396, respectively).

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Keywords

antioxidant capacity, chemically modified electrodes, chronoamperometry, electropolymerized materials, food analysis

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